

Low Impact Development at Naval Facilities: Opportunities and Constraints

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Policy and Regulatory Background



- **Navy Mandate - ASN Penn's Memo of November 16, 2007**
- **Federal Regulations - Energy Independent and Security Act of 2007 (EISA), Section 438**
- **Executive Order 13423 for federal facilities**
- **State/local storm water management regulations**

LID Practice Overview



■ Low Impact Development (LID)

A sustainable storm water management approach that can be used to replicate or restore natural watershed functions (the pre-development hydrologic regime) by implementing engineered small-scale hydrologic controls through infiltrating, filtering, storing, evaporating, and detaining runoff close to its source.

■ Common LID Practices

- *Bioretention*
- *Grass swale*
- *Filter/buffer strips*
- *Infiltration trenches/basins*
- *Inlet device*
- *Rain barrel, cisterns*
- *Tree box filters*
- *Vegetated roof covers*
- *Permeable pavers*
- *Soil amendment*

Recent LID Applications at Naval Facilities

■ Over 25 Navy Projects with LID (2008)

- *Bioretention (4)*
- *Grass swales (20)*
- *Filter/buffer strips (5)*
- *Infiltration trenches/basins (2)*
- *Inlet device (2)*
- *Rain barrels/cisterns (0)*
- *Tree box filters (1)*
- *Vegetated roof cover (1)*
- *Permeable pavement (4)*
- *Soil amendment (0)*

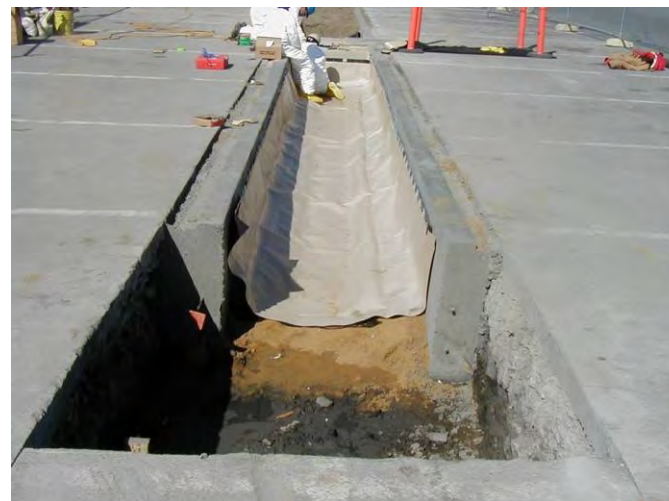
■ Washington Navy Yard Projects

- *Bioretention*
- *Permeable paver*
- *Tree box filters*
- *Vegetated filter strips*
- *Cisterns*
- *Vegetated roof cover*

■ Naval Station Norfolk

- *Bioretention*
- *Tree box filters (planters)*

Wash. Navy Yard LID Retrofit Demonstration Projects



**Bioretention cell
construction at a parking
area**



Wash. Navy Yard LID Retrofit Demonstration Projects



Permeable Paver Installation

(with gravel chips, pavers, perforated underdrain, and impermeable liner)

Wash. Navy Yard LID Retrofit Demonstration Projects



Curb Inlet and Tree Box

LID Projects at Naval Station Norfolk



Planters Treating Roof Drains from Buildings with Metals of Concern (2005)

LID Projects at Naval Station Norfolk



Bioretention Area Treating Roof Drains of a Steam Plant (2007)

LID Projects at Naval Station Norfolk



**Bioretention Area Treating Runoff from a 1.7 Acre Parking Area
(2006)**

LID Projects at Naval Station Norfolk



**Bioretention Areas Treating Runoff from a 10 Acre Parking Area
(2008)**

LID Projects at Naval Station Norfolk



**Bioretention Areas Treating Runoff from a 10 Acre Parking Area
(2008)**

LID Projects at Naval Station Norfolk



Bioretention Areas Treating Runoff from a 10 Acre Parking Area (2008)

General Naval Facility Characteristics



- **Most facilities are located in coastal areas**
- **Concentrated urban-like environment**
- **Limited industrial activities/operations**
- **Many Facilities still have undeveloped land**
- **Continued development and growth expected**

Opportunities on LID Applications



- **Timing and readiness**
- **Experience and expertise in LID implementation needed (planning, design, construction, maintenance, monitoring)**
- **All common LID practices are applicable or potentially applicable in Navy projects**

Constraints on LID Applications

- **Site characteristics**
- **Restoring pre-development hydrology and maintaining no net runoff/pollutant loadings – challenging goals**
- **Limited knowledge and experience with LID (planning, design, construction, life cycle management)**
- **Limited data related to cost, cost-benefit analysis, life-cycle cost analysis**
- **Potential conflicts with other design standards (e.g., road design standards) and state/local water laws (e.g., water harvesting, right of way, ...)**

Conclusions



- **LID – promising and proven practices in sustainable development.**
- **Abundant opportunities for applications of LID in Navy projects.**
- **LID are and will be found in MILCON / Navy projects, regardless of limitations mentioned above.**

QUESTIONS?

